

### REMARKS

The comments of the applicant below are each preceded by related comments of the examiner (in small, bold type).

**The disclosure is objected to because of the following informalities: enclosure of appendix is improper. An appendix is limited to enclosure of a sequence listing table or a computer program listing (see MPEP § 608.05). Otherwise, information contained within the appendix should be incorporated into the specification or filed through an IDS.**

**Appropriate correction is required.**

The applicant respectfully requests that correction of the requirement for incorporation of the appendix into the specification be deferred until such time as the examiner has determined that there are patentable claims.

**Claims 1 and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Admission (specification and appendix).**

**Regarding Claim 1, Admission discloses a method comprising:**

- **receiving data representing prices of options on a given asset (The idea that option prices determine some kind of implied probability distribution is fairly well known in the financial literature — see Appendix A, p. 1); and**
- **performing computations (second derivative) to derive from said data an estimate of a corresponding implied probability distribution of the price of said asset at a future time. (The idea that a pdf can be computed by taking the second derivative of a continuous price curve is known in the literature, but it does not appear to be very well known.” -- see Appendix A,p.1).**

Claim 1 has been amended to recite that “the computations include[e] a smoothing operation performed in a volatility domain, an operation on a result of the smoothing to obtain a first probability distribution, and a shift in a mean of the first probability distribution to obtain a second probability distribution.” The references relied upon by the examiner do not describe and would not have made obvious the claimed combination.

The examiner has used the applicant's disclosure and appendix as a road map to piece together elements of the acknowledged prior art. While individual aspects of the claimed invention may have been present in separate references, this by no means made it obvious to combine these aspects in the manner claimed to produce the claimed method. The examiner has

not pointed out any suggestion in the cited references that these aspects could be combined or that the combination would produce useful and valuable results. The applicant's position that this combination is far from obvious is further supported by the fact that the examiner has not produced any other references combining, or suggesting combining, these methods or similarly using them to predict the prices of assets, despite the fact that such predictions are clearly valuable. If the claimed method were obvious, others would have been practicing it.

Claims 2 and 3 are patentable for at least the reasons for which the claims on which they depend are patentable.

**Regarding Claim 8, Admission discloses a method comprising:**

- **receiving data representing prices of options on a given asset, the options being associated with spaced-apart strike prices of the asset at a future time. (supra — specification, p. 9);**
- **the data including shifted prices of options resulting from a shifted underlying price of the asset, (in the real world, the prices of the underlying asset changes with time and there will be a corresponding change in option prices.” — see specification, p. 12— establishing that as the price of the underlying asset shifts there is a corresponding shift in the option price, as is the nature of options in the existing option market);**
- **the amount by which the asset price has shifted being different from the amount by which the strike prices are spaced apart. (“In practice, options are usually traded within certain price ranges and only for certain price intervals (e.g. ranging from \$110 to \$180 at \$5 intervals). Thus, the call and/or put option prices are known only for a finite subset of strike prices.” — see specification, p. 9 - establishing that strike prices, by the nature of the options market, are only available in a finite number of spaced-apart price intervals. However, the price or value of the underlying asset does not have this limitation. The price or value of the underlying asset is not limited to a finite number of spaced-apart intervals and, therefore, the constrained strike prices cannot fully and accurately capture the infinite asset prices possible. As such the amount of the shift (increase or decrease) in the asset price (infinite possibilities) is different from the amount by which the strike prices are spaced apart (finite intervals);**
- **performing computations to derive from said data an estimate of a quantized implied probability distribution of the price of said asset at a future time. (“The idea that a pdf can be computed by taking the second derivative of a continuous price curve is known in the literature, but it does not appear to be very well known.” — see Appendix A, p. 1); and**

- the elements of the quantized probability distribution being more finely spaced (smoothed) than for a probability distribution derived without the shifted current price data. (“Any standard smoothing and extrapolation method may be used.. In an especially meaningful; example, we have experimented with a class of smoothing algorithms used in ‘Implied Volatility Functions: Empirical Tests’ by B. Dumas, J Fleming and RE. Whaley. J, Finance vol. 53, pp. 205g —2106, Dec. 1998...Thus, we use the Dumas-Fleming-Whaley model for our own entirely different purpose, that of forecasting probability distributions.” — see appendix, p. 8).

Claim 8 has been amended. Neither the appendix nor any cited reference discloses or would have made obvious “estimating, based on the prices of the options at the second time, prices of options at the first time” and that “the elements of the quantized probability distribution correspond[] to both the prices of options at the first time and the prices of options at the first time estimated from the observations at the second time.”

**Admission does not teach a method comprising:**

- receiving data representing current prices of options on a given asset, the options being associated with spaced-apart strike prices of the asset at a future time;
- the data including shifted current prices of options resulting from a shifted underlying price of the asset; and
- by machine, performing computations to derive from said data an estimate of a quantized implied probability distribution of the price of said asset at a future time...

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Admission by incorporating the ability to input current prices of options into the calculations to provide the most up-to-date data for the calculations.

Additionally, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have automated the method, since it has been held that broadly providing a mechanical or automatic means to replace manual activity that accomplishes the same result involves only routine skill in the art. In re Vennor, 120 USPQ 192.

Regarding Claim 9, Claim 9 recites similar limitations to Claims 1 and 8, in combination, and is therefore rejected using the same art and rationale as applied in the rejection of Claims 1 and 8.

The applicant disagrees. Referring to the examiner's statement regarding smoothing in claim 8 (while pointing out that claim 8 never did and still does not recite “smoothing”), the

applicant notes that while the specification may state that "any standard smoothing and extrapolation method may be used," this would not have made it obvious to in fact use such a method in the first place. Neither the specification, the appendix, nor any cited reference describes or would have made obvious the combination of "performing computations to derive from said data an estimate of an implied probability distribution of the price of said asset at a future time" and "the mathematical derivation including a smoothing operation."

**Regarding Claim 10 Admission does not teach a method in which the smoothing operation is performed in a volatility domain. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified smoothing operation, as disclosed by Admission, to allow for smoothing in any domain or for any variable that the inventor desired.**

Claim 10 is patentable for at least the reasons for which claim 9, on which it depends, is patentable.

Canceled claims, if any, have been canceled without prejudice or disclaimer.

Any circumstance in which the applicant has (a) addressed certain comments of the examiner does not mean that the applicant concedes other comments of the examiner, (b) made arguments for the patentability of some claims does not mean that there are not other good reasons for patentability of those claims and other claims, or (c) amended or canceled a claim does not mean that the applicant concedes any of the examiner's positions with respect to that claim or other claims.

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Enclosed is a \$450 check for the Petition for Extension of Time fee. Please apply any other charges or credits to deposit account 06-1050, reference 11910-002001.

Respectfully submitted,

Date: \_\_\_\_\_

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